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Credit Risk Management in Nigerian Banks (2005 – 2015)

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Abstract:
This study examines credit risk management in Nigerian banks. Content analysis approach was used to examine 15 banks over a ten years period. Findings from the study revealed that credit risk architecture significantly affects loan recovery of selected banks in Nigeria. Also GDP, NPL, interest rate and unemployment significantly affects the credit risk structure of banks in Nigeria. However inflation had insignificant effect on the credit risk structure of banks in Nigeria. We recommend that banks should enhance their credit risk architecture to always include collateral review and management, facility performance monitoring, quality reviews classification and risk portfolio reporting. Again, banks credit granting decision should be based on the result of risk assessment client's solvency, available collateral, and transaction compliance with policies.
Keywords: Credit risk, Credit structure, and Content analysis, Credit Risk Architecture.

1.0 Introduction

Banks, particularly in developing economies play a catalytic role in mobilizing investible funds which aids economic growth. Through their intermediation role, banks serve as 'quality controllers' in guiding capital to profitable projects in order to ensure higher returns and to accelerate economic growth. The extent to which banks succeed in meeting these expectations in the economic space is to a large extent dependent on their risk management structure. According to Hale (2012) lending is the principal business activity for most commercial banks. The loan portfolio is typically the largest asset and the predominant source of revenue. As such, it is one of the greatest sources of risk to a bank's safety and soundness. Banks operate in an environment where there is a lot of pressure from competitors, effect of economic factors (inflation rates, interest rates, exchange rates, unemployment.) and need for customers' satisfaction. This nature of banking business contains an environment of high risk with varying complexities. These risks are much more complex because a single activity can involve several risks.

Luy (2010) defines risk as "something happening that may have an impact on the achievement of objectives". Risks exist because of the inability of the decision maker to make perfect forecasts. It is also widely associated with the variability of future returns of a project or economic engagements. Banking risks are classified into credit risk, market risk, and operational risk (Basel, 2009). The focus of this study is on credit risk. This type of risk usually arises, whenever a lender is exposed to loss from a borrower, counterparty, or an obligator who fails to honour their debt obligation as they have contracted. According to Colquitt (2007), "this loss may derive from deterioration in the counterparty's credit quality, which consequently leads to a loss to the value of the debt, or the borrower defaults when he is unable to fulfill the obligations."

Specifically, risk asset refers to an asset owned by a bank or financial institution whose value may fluctuate due to changes in interest rate, credit quality, repayment risk, etc. In practical terms, this refers to loans granted to borrowers at specific terms and conditions. It is a risk asset because these terms and conditions can be breached and repayment can be in default. The issue of credit risk is of greater concern because of the higher level of perceived risks resulting from some of the characteristics of clients and business conditions that they find themselves in. CBN (2011) rightly noted that a recognized risk is less risky than the unidentified risk. Adequate management of credit risk is therefore critical for the survival and growth of all commercial banks.

Credit risk requires that the board and management understand and control the bank's risk profile and its credit culture. To accomplish this, they must have a thorough knowledge of the portfolio's composition and its inherent risks. They must understand the portfolio's product mix, industry and geographic concentrations, average risk ratings, and other aggregate characteristics. As opined by Saunders and Linda (2002) "lending is undoubtedly the heart of the banking business". Therefore, its administration requires considerable skill and dexterity on the part of the bank management. Among other risks faced by banks, credit risk plays an important role on banks' profitability since a large chunk of banks' revenue accrues from loans from which interest is derived.

However, interest rate risk is directly linked to credit risk implying that high or increment in interest rate increases the chances of loan default. According to (Drehman, Sorensen, & Stringa, 2008) credit risk and interest rate risks are intrinsically related to each other and not separable. Also as explained by Egene (2009), credit risk management needs to be a robust process that enables financial Institutions to proactively manage facility portfolios in order to minimize losses and earn an acceptable level of return for shareholders. Brown, Askew,

Baker, Denvir, and Millett (2003), added that credit risk management is a "structured approach to managing uncertainties through risk assessment, developing strategies to manage it, and mitigating risk using managerial resources."

Commercial Banks are expected to bridge the gap between the surplus and deficit units of the economy in order to revitalize and stabilize the flow of credits while limiting credit risk. It is quite worrisome that banks are not adequately living up to these expectations of effectively managing their credit risks. The quality of loans and recovery by commercial banks are presently being impaired with the incidence of a large portfolio of non-performing loans, in spite of the provisions of the Basel II Accord. The position of the banks to also act as prime movers of economic development and to effectively manage their credit risk, does not juxtapose their position as such; if not, why then should banks be saturated with high nonperforming loans? Can effective credit risk architecture correct these anomalies? This study therefore evaluates credit risk management in Nigerian Banks between 2005 and 2015. We will determine if the credit risk architecture of the selected banks in Nigeria minimizes credit risk.

However, to achieve these objectives the following hypotheses were posed for this study:

1. Credit risk architecture does not significantly affect the loan recovery of selected banks in Nigeria.
2. GDP, NPL, interest rate, inflation rate and unemployment does not significantly affect the credit risk architecture of the selected banks in Nigeria.

2.0 Review of Related Literature

Management of credit risks has been identified to be critical for the survival and growth of banks. There are varieties of aspects that need to be taken into account when considering a suitable architecture for credit risk management. Credit risk infrastructure usually depends to a very large extent on the risk appetite and culture of the company. This architectural consideration revolves on maintaining tight credit risk metrics which largely need to be delivered in real time, depending on the product set and markets covered. Tight credit risk management means that there is a need to restrict the size of the individual manager (or group, smaller or larger) directional bias; it has to maintain well defined, monitored and acted upon drawdown limits.

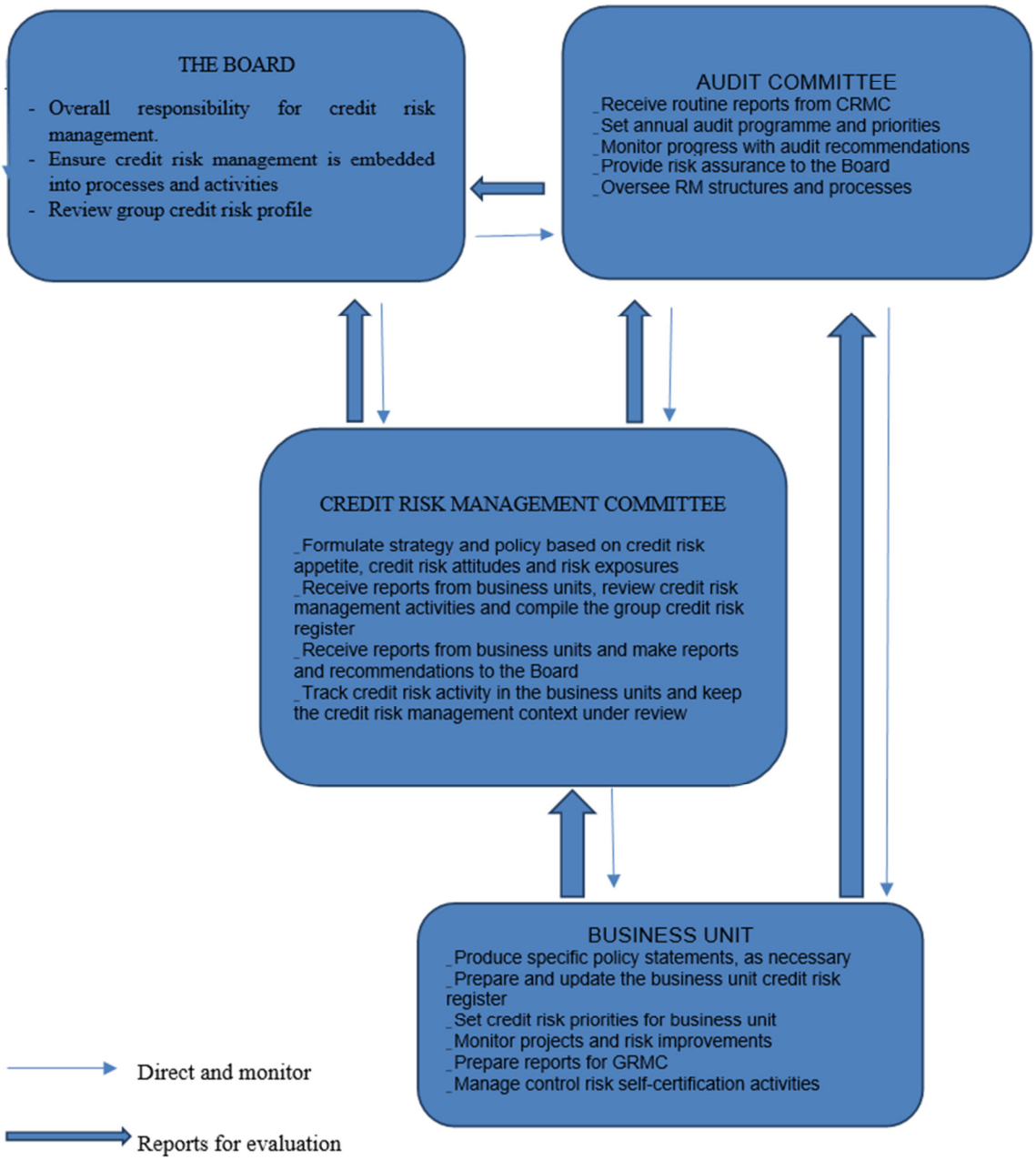
In terms of the senior managers' responsibility, these may include allocation of capital to portfolio managers and strategies, depending on how these are defined in the institution; monitor and oversee various levels of portfolio managers; and monitor and approve trading limits. As part of the assessments required to establish the major areas important for the credit risk management in a financial institution, it is important for the system architects to consider the following: the importance of an integrated workflow across execution and credit risk management systems; credit risk management functionality requirements in terms of priorities mainly involving credit risk diagnostic-predictive analysis- hedging and portfolio analysis; historical data and performance measurement requirements and overall existing credit risk management systems assessment. The actualization of these approaches will assist banks in the stabilization and enhancement of their existing systems credit risk management, of not only meeting regulatory requirements but improving data quality and flexibility to ensure favourable loan recovery.

2.1 Conceptual Model of Credit Risk Architecture

The conceptual model of the study states that Banks are expected to issue an updated version of their credit risk management policy each year. This ensures that the overall credit risk management approach is in line with current best practice. It also gives the bank the opportunity to focus on the intended benefits for the coming year, identify the risk priorities and ensure that appropriate attention is paid to emerging risks. The policy should also describe the credit risk architecture of the bank as illustrated in Figure 1.

Mandate and commitment from the Board is critically important and it needs to be continuous and high-profile. Unless this mandate and commitment are forthcoming, the credit risk management initiative will be unsuccessful. Keeping the credit risk management policy up to date demonstrates that credit risk management is a dynamic activity fully supported by the Board.

In order to be successful, the Credit risk management architecture needs to be comprehensive. The credit risk architecture no doubt sets the tone for credit risk management organisation and arrangements. By this the board of directors will direct and monitor the activities of the credit management committee, who in turn reports to the board for evaluation. Same can be seen between the business units of the bank, who produces specific policy statements and also reports to the credit risk committee for evaluation, while directing and monitoring their activities. All of these is to provide check and balances to the fulfillment of an efficient credit management and the enhancement of credit quality.



Source: Developed by Researchers (2017)

Figure 1. Conceptual Model of Credit Risk Architecture

2.2 Credit Risk Management

A bank exists not only to accept deposits but also to grant credit facilities, therefore inevitably exposed to credit risk. Credit risk is by far the most significant risk faced by banks and the success of their business depends on accurate measurement and efficient management of this risk to a greater extent than any other risks (Gieseche, 2004). According to Chen and Pan (2012), credit risk is "the degree of value fluctuations in debt instruments and derivatives due to changes in the underlying credit quality of borrowers and counterparties".

As observed by Chazen (1995), Credit Risk is the major component of risk management system and this should receive special attention by the top management of a bank. Credit risk is the important dimension of various risks inherent in a credit proposal, as it involves default of the principal itself. According to Raghavan (2005) Credit risk consists of primarily two components: Quantity of risk, which is nothing but the outstanding loan balance as on the date of default and the Quality of risk, which is the severity of loss defined by Probability of Default as reduced by the recoveries that could be made in the event of default. Thus credit risk is a combined outcome of Default Risk and Exposure Risk. The elements of Credit Risk are Portfolio risk comprising

Concentration Risk as well as Intrinsic Risk and Transaction Risk comprising migration/down gradation risk as well as Default Risk. At the transaction level, credit ratings are useful measures of evaluating credit risk that is prevalent across the entire organization where treasury and credit functions are handled.

Coyle (2000) defines credit risk as "losses from the refusal or inability of credit customers to pay what is owed in full and on time". Credit risk is the exposure faced by banks when a borrower (customer) defaults in honouring debt obligations on due date or at maturity. This risk interchangeably called 'counterparty risk' is capable of putting the bank in distress if not adequately managed. Credit risk management maximizes banks' risk adjusted rate of return by maintaining credit risk exposure within acceptable limits in order to provide framework for understanding the impact of credit risk management on banks' profitability (Kargi, 2011). Demirguc-Kunt & Huzinga (1999) opined that credit risk management is in two-fold which includes, the realization that after losses have occurred, the losses become unbearable and the developments in the field of financing commercial paper and securitization, has pushed banks to find viable loan borrowers.

The main source of credit risk include, limited institutional capacity, inappropriate credit policies, volatile interest rates, poor management, inappropriate laws, low capital and liquidity levels, direct lending, massive licensing of banks, poor loan underwriting, laxity in credit assessment, poor lending practices, government interference and inadequate supervision by the central bank (Kithinji, 2010).An increase in bank credit risk gradually leads to liquidity and solvency problems. Credit risk may increase, if the bank lends to borrowers it does not have adequate knowledge about.

2.3 Central Bank of Nigeria (CBN)

The Central Bank of Nigeria is the main statutory regulator of banks and nonbanking financial institutions under the provisions of the Banks and Other Financial Institutions Act Amendment (1998). Banks are required to report large borrowing to the CBN. The CBN also require that the total value of a loan credit facility or any other liability in respect of a borrower, at any time, should not exceed 20% of the shareholders' funds unimpaired by losses in the case of commercial banks (Felicia, 2011).

CBN requires banks to maintain adequate capital to meet their financial obligations, operate profitably and contribute to promoting a sound financial system. It is for these reasons that the CBN prescribes minimum capital requirements. This minimum ratio of capital adequacy has been increased from 6 percent in 1992 to 8 percent in 1996. It is further stipulated that at least 50 percent of the component of a banks' capital shall comprise paid-up capital and reserves, while every bank shall maintain a ratio of not less than one to ten (1:10) between its adjusted capital funds and its total credit. When a bank's capital falls below the prescribed ratio, it is an indication that the bank may be heading for distress (Harrington, 1999).

2.4 Risk Management Architecture

Risk system architecture is a system with a number of core components that collaborate and react to external events and perform required actions. Some of the core functions of the system include the ability to keep track of all the activities executed as part of the trading operation, the ability to track the most current risk profile as well as the "as-of-date" status at some point in the past (in case an analysis needs to be performed, which is invariably the case), support for a superset of all the products traded in the relevant target business area (which can become very challenging for a truly cross-asset system) and the capability to continuously evolve in line with market evolutions and indeed the ability to support continuous change (in case a new product requires to be traded on very short notice, as again is indeed the case on a fairly constant basis) (Taleb, 1996). In order to support such functions, the system requires a complex infrastructure, made even more complicated by the requirements of the Sarbanes-Oxley acts which enforce complete auditing. In day-to-day operations a risk system allows continuous updates to its position status (both from manual as well as automated sources), updates the pricing data from the markets, uses relevant pricing and risk models and outputs the required updates in prices and positions. Simultaneously the system needs to be responsive enough so as to allow for ad-hoc user commands. By implementing these functions the risk system executes the actions needed such as estimating risk explanatory parameters, recalculating affected positions and keeping in line with the changing underlying prices and associated markets (Das, 1994). The types of actions and events that a risk system supports and provides include: support for both simple (one-off parameters changes, such as spot level for example, to allow a what-if scenario simulation) as well as complex user operations (such as executing scenario ad-hoc simulations during market hours), support for continuous system status changes resulting from market price updates, trade events (both manual and automated), user driven events (changing the parameters such as credit spreads, volatility, interest rate, dividends), as well as general system events (market status, system health states, network links). A central component of the risk system is the pricing library which needs to cover all product types (Fabozzi, 1996).

Credit risk management architecture sets out the machinery for the day-to-day administration of risk assets. Although, the organizational structure of the lending function varies from bank to bank, the system adopted by a particular lending institution is largely determined by the board's attitude towards delegation of authority to the

rank and file of loan officers, the character and quality of the lending officers, and the bank's size and its loan portfolio. For example, while a single loan officer in a small bank may perform all the activities involved, in the larger ones, there is a much greater level of departmentalization and specialization in the credit administration process. The machinery for routine administration, in respect of the bank is usually formulated along some general guidelines which include supervision, observance of covenants, margin requirements, excess lines, draw-downs, insurance and management of problem loans. These functions are executed by the various committees set up by the bank/ lender. In practice, there is usually a Directors' Loan Committee (DLC) as well as Officer Loan Review Committee (OLRC). The Directors' Loan Committee which is made up of the bank's MD, a senior loan officer and at least two board members is charged with such responsibilities as handling loan proposals beyond the scope of the OLRC and requests bordering on policy.

The OLRC is responsible for the continuous review of the bank's loan portfolio. It meets over troubled or distressed loans and reports to the Chief Executive and to the Board. It follows up on all weak loans until their weakness is corrected or the loan is collected. The OLRC in most banks has authority to reassign the loan if the officer is not making progress on the recovery. These two groups of loan committees are supported by Hampel et al (1986). He submitted that two committees are necessary.

Banks, generally, have credit units or departments which perform crucial roles in the loan administration function. The department is supervisory in nature. It is separated from the credit approval function and serves primarily to advice or counsels both management and the credit officers. The composition varies from bank to bank (Kwaku, 2015).

3.0 Methodology

3.1 Research Design

An attempt was made in this study to examine credit risk management in Nigerian banks by examining approaches adopted by 15 banks over ten years period. The study adopted content analysis design. This design was used to examine the consistency of credit risk architecture with Basel II Accord of the selected banks.

3.2 Method of Data Collection

The researcher used secondary data obtained from the annual reports of Commercial Banks in Nigeria, and extant literatures containing required information on the provision of Basel II Accord. The study used content analysis. This was done through the researcher's checklist to specifically obtain information on credit risk architecture, and to gauge the consistency of banks' credit risk structure with provision of Basel II Accord.

We adopted the unweighted approach for the scoring in line with Cooke (1989) unweighted model for content analysis. Each item of the credit risk architecture were all important. This approach reduces subjectivity and it provides a neutral assessment of items. This approach uses a dichotomous procedure to develop a scoring scheme that captures the importance of all component part of the structure. Complete annual report for each bank was reviewed in order to understand the nature and complexity of each banks' credit risk architectural operation and to form an opinion about the banks before scoring the items. Each reporting items on the checklist was assigned "0" if it is not carried out, "1" if it is partially carried out (not in details), and "2" if it was fully carried out.

3.3 Model Specification

The empirical models for this study are as specified below:

Model 1

This model utilizes secondary data on (credit risk Architecture) and loan recovery. The full specification of the regression equations are assumed to be as follows:

$$LR = \beta_0 + \beta_1 CRA + \varepsilon_1 \quad (1)$$

Model 2

This model utilizes secondary data on credit risk structure and Gross Domestic Product, Non-performing loans, interest rate, Inflation, unemployment. The full specification of the regression equations are assumed to be as follows:

$$CRA = \alpha_0 + \alpha_1 GDP + \alpha_2 NPL + \alpha_3 INT + \alpha_4 INF + \alpha_5 UNEMP + \varepsilon_2 \quad (2)$$

Where:

α_1- α_5, β_1- β_1 = Parameters to the explanatory variables

α_0, β_0= The Intercepts

ε_1, ε_2, = Random or Error term or Stochastic variables.

CRA= Credit Risk Architecture

GDP= Gross domestic product

NPL= Non-performing loans

INT= Interest rate

INF= Inflation rate
UNMP = Unemployment rate
LR= loan recovery
The 'a priori expectations for model one, is:
$\beta_1 > 0$; implying that the higher the CRA, the higher the loan recovery in Nigeria,
The 'a priori expectations for model two, are:
$\alpha_1 > 0$; implying that the higher the GDP, the higher the Credit Risk Architecture in Nigeria,
$\alpha_2 < 0$; implying that the higher the NPL, the lower the Credit Risk Architecture in Nigeria,
$\alpha_3 < 0$; implying that the higher the interest rate, the lower Credit Risk Architecture in Nigeria,
$\alpha_4 < 0$; implying that the higher the INF, the lower the Credit Risk Architecture in Nigeria,
$\alpha_5 < 0$; implying that the higher the rate of Unemployment, the lower Credit Risk Architecture in Nigeria.

3.4 Method of Data Analyses
Estimation of the model involves obtaining numerical values for the estimate of the parameters. The Ordinary Least Squares (OLS) Method was adopted to test hypotheses one and two for the estimation of the relationship of the model specified. OLS is usually used to examine the extent of the relationship between the explanatory variable(s) and the dependent variable. Population T-test is used to evaluate the significant difference between a sample mean and a population mean.

Testing of the estimates of the regression results was employed. The various statistical and econometric criteria for evaluating the parameter estimates of the regression models such as t-statistic, R^2-Statistics, adjusted R^2-statistics, F-statistics, as well as diagnostic tests was analyzed. The diagnostic tests of Durbin-Watson, Variance Inflation Factor and Tolerance will enable us to know if there is any threat of multicollinearity and independent errors. Traditionally, multicollinearity does not constitute a problem when the VIF does not exceed 10 and Tolerance for each of the variable is above 0.2 (Chavent et al., 2006; Field, 2006). The significance coefficient of the F-statistics was used in determining if there is any heteroskedasticity problem. Statistical significance of the result is determined using t-statistics using 5% levels of significance.

4.0 Data Presentation, Analysis And Discussion of Findings

4.1 Data Presentation
Table1. Cumulative Data on Credit Risk Architecture from 2005 to 2015

Banks	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1. GT Bank Nig.	0.955	0.899	0.859	0.841	0.96	0.802	0.898	0.919	0.910	0.864	0.591
2. First Bank Nig.	0.909	0.709	0.805	0.611	0.956	0.967	0.883	0.949	0.901	0.886	0.659
3. Zenith Bank Nig.	0.932	0.896	0.704	0.586	0.940	0.968	0.917	0.899	0.910	0.8310	0.500
4. Union Bank of Nig.	0.864	0.753	0.660	0.786	0.920	0.949	0.797	0.951	0.955	0.709	0.522
5. Access Bank Nig.	0.886	0.884	0.753	0.682	0.940	0.959	0.906	0.936	0.796	0.841	0.503
6. EcoBank Nig.	0.977	0.863	0.737	0.727	0.936	0.959	0.909	0.931	0.909	0.841	0.507
7. Stanbic IBTC Bank	0.841	0.827	0.752	0.545	0.946	0.949	0.898	0.966	0.773	0.773	0.568
8. Skye BankNig	0.886	0.647	0.880	0.810	0.949	0.949	0.909	0.971	0.905	0.774	0.505
9.DiamondBank	0.932	0.801	0.818	0.909	0.980	0.960	0.806	0.951	0.905	0.864	0.523
10. First City Monument Bank	0.818	0.681	0.752	0.636	0.950	0.909	0.905	0.908	0.910	0.841	0.477
11. Sterling Bank	0.773	0.592	0.736	0.613	0.896	0.909	0.903	0.950	0.901	0.796	0.510
12. Fidelity Bank Nig. PLC	0.818	0.799	0.864	0.615	0.950	0.924	0.891	0.924	0.864	0.901	0.570
13. United Bank for Africa	0.864	0.673	0.727	0.752	0.905	0.951	0.893	0.905	0.890	0.820	0.591
14. Unity Bank Plc.	0.818	0.709	0.841	0.455	0.943	0.951	0.879	0.893	0.910	0.750	0.409
15. WemaBankNig	0.909	0.682	0.682	0.682	0.959	0.906	0.591	0.981	0.863	0.682	0.570
Total	13.182	11.415	11.570	10.250	14.130	14.012	12.985	14.034	13.302	12.173	8.005

Source: Field work, 2017

Table 4.2.1 presented the cumulative data on credit risk architecture of 15 selected banks from 2005 to 2015. These data were drawn from a 22-item credit risk architecture template that was applied on selected banks between 2005 to 2015. The weighted averages of the credit risk architecture for some of the selected banks reveals that GT Bank Nigeria had a weighted average of 0.955 on its 22-items in 2005. In 2006, it had a weighted average of 0.899. GT Bank recorded a weighted average of 0.859 for 2007; 0.841 for 2008 and 0.591 for 2015. It was discovered that GT Bank recorded the lowest level of credit risk architecture in 2015.

First Bank Nigeria recorded a weighted average of 0.909 for 2005; 0.709 for 2006; 0.611 for 2008 and had a weighted average of 0.659 for 2015. In all, the least of the weighted average was for 2008 with 0.611. Zenith Bank Nigeria recorded a weighted average of 0.932 for 2005; 0.896 for 2006; 0.586 for 2008 and had a weighted average of 0.500 for 2015. In all, the least of the weighted average was for 2015 with 0.500. Union Bank Nigeria recorded a weighted average of 0.864 for 2005; 0.753 for 2006; 0.786 for 2008 and had a weighted average of 0.522 for 2015. In all, the least of the weighted average was for 2015 with 0.522.

Access Bank Nigeria recorded a weighted average of 0.886 for 2005; 0.884 for 2006; 0.682 for 2008 and

had a weighted average of 0.503 for 2015. In all, the least of the weighted average was for 2015 with 0.503.Eco Bank Nigeria recorded a weighted average of 0.977 for 2005; 0.863 for 2006; 0.727 for 2008 and had a weighted average of 0.507 for 2015. In all, the least of the weighted average was for 2015 with 0.507.

Stanbic IBTC Bank scored a weighted average of 0.841 for 2005; 0.827 for 2006; 0.545 for 2008 and had a weighted average of 0.568 for 2015. In all, the least of the weighted average was for 2008 with 0.545. Skye Bank Nigeria recorded a weighted average of 0.886 for 2005; 0.647 for 2006; 0.880 for 2008 and had a weighted average of 0.505 for 2015. In all, the least of the weighted average was for 2015 with 0.505 indexes.

Data on credit risk architecture from Diamond Bank shows a weighted average of 0.932 for 2005; 0.801 for 2006; 0.818 for 2007; 0.909 for 2008; 0.980 for 2009 and had a weighted average of 0.523 for 2015. The least of the weighted average was for 2015 with 0.523. FCMB recorded a weighted average of 0.818 for 2005; 0.681 for 2006; 0.752 for 2007 and had a weighted average of 0.477 for 2015. The least of the weighted average was for 2015 with 0.477. Sterling Bank shows a weighted average of 0.773 for 2005; 0.592 for 2006; 0.736 for 2007; 0.613 for 2008; 0.896 for 2009 and had a weighted average of 0.510 for 2015. The least of the weighted average was for 2015 with 0.510. Fidelity Bank recorded a weighted average of 0.818 for 2005; 0.799 for 2006; 0.864 for 2007; 0.615 for 2008; 0.950 for 2009 and had a weighted average of 0.570 for 2015. The least of the weighted average was for 2015 with 0.570. Unity Bank shows a weighted average of 0.818 for 2005; 0.709 for 2006; 0.841 for 2007; 0.455 for 2008 and had a weighted average of 0.409 for 2015. The least of the weighted average was for 2015 with 0.409. Wema Bank recorded a weighted average of 0.909 for 2005; 0.682 for 2006; 0.682 for 2007; 0.682 for 2008; 0.959 for 2009 and had a weighted average of 0.570 for 2015. The least of the weighted average was for 2015 with 0.570.

Table 2. Data on Loan Recovery Index (2005 to 2015)

Banks	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1. GT Bank Nig.	0.937	0.625	0.750	0.950	0.490	0.900	0.450	0.960	0.960	0.910	0.520
2. First Bank Nig.	0.937	0.750	0.650	0.950	0.480	0.910	0.650	0.950	0.890	0.920	0.350
3. Zenith Bank Nig.	0.937	0.850	0.850	0.940	0.710	0.960	0.650	0.950	0.950	0.960	0.420
4. Union Bank of Nig.	0.937	0.580	0.550	0.950	0.680	0.950	0.550	0.980	0.910	0.980	0.750
5. Access Bank Nig.	0.937	0.850	0.625	0.950	0.540	0.930	0.450	0.960	0.960	0.960	0.550
6. EcoBank Nig.	0.875	0.850	0.650	0.980	0.860	0.950	0.930	0.950	0.980	0.950	0.450
7. Stanbic IBTC Bank	0.937	0.450	0.850	0.950	0.950	0.980	0.960	0.960	0.960	0.960	0.850
8. Skye BankNig	0.937	0.650	0.937	0.950	0.960	0.910	0.950	0.950	0.950	0.950	0.480
9. Diamond Bank	0.937	0.650	0.850	0.950	0.920	0.950	0.950	0.980	0.950	0.930	0.550
10. First City Monument Bank	0.937	0.550	0.750	0.910	0.920	0.910	0.980	0.960	0.980	0.960	0.490
11. Sterling Bank	0.937	0.450	0.750	0.950	0.910	0.940	0.960	0.910	0.960	0.960	0.850
12. Fidelity Bank Nig. PLC	0.875	0.850	0.850	0.920	0.840	0.950	0.850	0.950	0.900	0.980	0.610
13. United Bank for Africa	0.937	0.750	0.850	0.900	0.850	0.960	0.580	0.960	0.960	0.960	0.850
14. Unity Bank Plc.	0.875	0.650	0.850	0.670	0.860	0.960	0.760	0.960	0.910	0.950	0.670
15. WemaBankNig	0.850	0.850	0.500	0.420	0.520	0.920	0.850	0.980	0.850	0.950	0.650
Total	14.157	10.355	11.230	13.340	11.490	14.080	11.520	14.360	14.070	14.280	9.040

Source: Field work, 2017

Table 4.2.2 entails information on loan recovery index of the 15 selected banks from 2005 to 2015. These data were drawn from an 8-itemloan recovery template that was applied on selected banks within 2005 to 2015. The weighted averages of the loan recovery index for some of the selected banks reveals that GT Bank Nigeria had a weighted average of 0.95 on its 8 items in 2005. In 2006, it had a weighted average of 0.625. It also recorded a weighted average of 0.75 for 2007 and 0.52 for 2015. It was discovered that GT Bank recorded the lowest level of loan recovery index in 2011 with an index of 0.45.

First Bank Nigeria recorded a weighted average of 0.98 for 2005; 0.75 for 2006; 0.64 for 2007 and had a weighted average of 0.35 for 2015. In all, the least of the weighted average was for 2015 with 0.35. Zenith Bank Nigeria recorded a weighted average of 0.96 for 2005; 0.85 for 2006; 0.94 for 2008 and had a weighted average of 0.42 for 2015. In all, the least of the weighted average was for 2015 with 0.42.

Union Bank Nigeria recorded a weighted average of 0.95 for 2005; 0.58 for 2006; 0.55 for 2007 and had a weighted average of 0.75 for 2015. In all, the least of the weighted average was for 2015 with 0.75. Access Bank Nigeria recorded a weighted average of 0.96 for 2005; 0.85 for 2006 and had a weighted average of 0.55 for 2015. EcoBank Nigeria recorded a weighted average of 0.95 for 2005; 0.85 for 2006 and had a weighted average of 0.45.

Stanbic IBTC Bank scored a weighted average of 0.93 for 2005; 0.45 for 2006 and had a weighted average of 0.85. Skye Bank Nigeria recorded a weighted average of 0.96 for 2005; 0.65 for 2006 and had a weighted average of 0.48 for 2015. In all, the least of the weighted average was for 2015 with 0.48 indexes. Data on credit risk architecture from Diamond Bank shows a weighted average of 0.96 for 2005; 0.65 for 2006 and had a weighted average of 0.55 for 2015. The least of the weighted average was for 2015 with 0.55. FCMB recorded a

weighted average of 0.98 for 2005; 0.55 for 2006 and had a weighted average of 0.49 for 2015. The least of the weighted average was for 2015 with 0.49.

Sterling Bank shows a weighted average of 0.9 for 2005; 0.45 for 2006 and had a weighted average of 0.85 for 2015. The least of the weighted average was for 2006 with 0.45. Fidelity Bank recorded a weighted average of 0.9 for 2005; 0.85 for 2006 and had a weighted average of 0.61 for 2015. The least of the weighted average was for 2015 with 0.61.

Unity Bank shows a weighted average of 0.91 for 2005; 0.65 for 2006; 0.86 for 2007 and had a weighted average of 0.67 for 2015. The least of the weighted average was for 2006 with 0.45. Wema Bank recorded a weighted average of 0.85 for 2005; 0.85 for 2006 and had a weighted average of 0.65 for 2015. The least of the weighted average was for 2015 with 0.53.

Table 3. Data on GDP, NPL, Interest rate, Inflation rate and Unemployment (2005 to 2015)

Year	Inflation rates	GDP	NPL	Interest Rate	Unemployment rates
2005	17.80	169.65	18.10	7.42	11.90
2006	8.40	222.79	8.80	7.16	12.30
2007	5.40	262.22	.0	6.65	12.70
2008	11.50	330.26	6.30	3.51	14.90
2009	12.60	297.46	37.30	5.07	19.70
2010	13.72	369.06	20.10	11.06	21.10
2011	10.84	414.10	9.80	10.32	23.90
2012	12.22	460.95	8.70	8.39	18.90
2013	8.48	514.97	3.40	8.78	21.20
2014	8.06	568.50	3.00	7.21	23.50
2015	9.00	493.83	5.30	7.70	27.20

Source: CBN annual reports, 2010, 2015; NBS 2015

Table 4.2.3 presented data on GDP, NPL, Interest rate, inflation rate and unemployment rates in Nigeria from 2005 to 2015. This information was used as independent variables. It was also revealed that inflation rate was on the increase since 2013 to date, while the country's GDP deteriorated in 2015. The non-performing loan ratio to total loan also increased in 2015. Interest rates also increased as well as the unemployment, as it persisted even up to 27.20 percent

Table 4a Model Summary on Hypotheses One

Model Summary on hypothesis one

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.608[a]	.370	.300	1.56878

a. Predictors: (Constant), Credit_risk_ Arc

Table 4b

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	13.010	1	13.010	5.286	.047[a]
	Residual	22.150	9	2.461		
	Total	35.160	10			

a. Predictors: (Constant), Credit_risk_Arc

b. Dependent Variable: loan_recovery (credit risk)

Table 4c

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.655	3.030		1.866	.095
	Credit_risk_ Arc	.553	.241	.608	2.299	.047

a. Dependent Variable: loan recovery (credit risk)

Model Summary on Hypotheses Two

Table 5a

Model Summary hypothesis two

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.935[a]	.875	.750	1.03068

a. Predictors: (Constant), NPL, unemploy_rate, Interest_rate, Infla_rate, GDP

Table 5b

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.224	5	7.445	7.008	.026[a]
	Residual	5.312	5	1.062		
	Total	42.536	10			

a. Predictors: (Constant), NPL, unemploy_rate, Interest_rate, Infla_rate, GDP

b.

b. Dependent Variable: Crerit_risk_ architecture

Table 5c

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	9.049	1.888		4.793	.005
Infla_rate	-.074	.134	-.122	-.553	.604
unemploy_rate	-.665	.154	-1.683	-4.314	.008
Interest_rate	.628	.180	.652	3.487	.018
GDP	.025	.006	1.569	3.965	.011
NPL	.236	.051	1.218	4.625	.006

a. Dependent Variable: Crerit_risk_architecture

Source: Researchers computation, 2017

4.2 Analysis of Data

Linear regression was used for the test of the hypotheses. This was followed with the estimated Pearson Correlation, Standard Errors, t-value and the Coefficient of determination. The level of significance of 5 percent was used. For 5 percent level of significance, this means that there are 5 chances in 100 that the hypothesis tested would be rejected when they should actually have been accepted, which invariably means that the researcher has 95 percent confidence that the result is not due to chance. The standard error of the estimated parameter indicates how much the estimated parameter is likely to be affected by random factors. "The t-value of the estimated coefficient measures how large the value of estimated coefficient is relative to its standard error" (Gujarati, 2005: 67).

Tables 4.2.5 a, b and c indicate the effect of Credit risk architecture on the loan recovery of selected banks in Nigeria. The coefficient of determination R^2 showed an unfavorable fit of 0.370 with an adjusted R^2 of 0.300. This adjusted R^2 shows that only about 30 percent of the observed changes in the loan recovery was explained by changes in credit risk architecture. The result of the adjusted R-squared was coincident, this is because the collective statistical significance that was valued with the F-statistics reveals a partially favorable levels of [Fcal = 5.286 > $Fcri_{0.05}$ = 3.84]. This however shows that our model has a predictive power.

However, in order to evaluate the statistical significance of Credit risk architecture on loan recovery of selected banks in Nigeria, the t-statistics value was used and it was discovered that the expected apriori expectation for the independent variables, confirmed the theoretical stance that Credit risk architecture significantly affect the loan recovery of selected banks in Nigeria. The relationship of the independent variable was statistically significant at unconventional level [t_{cal} = 2.299 > $t_{0.05}$ = 1.697] for credit risk architecture. However in its significant state, credit risk architecture was also positive.

Tables 4.2.6 a, b and c also indicate the effect of GDP, NPL, Interest rate, inflation rate and unemployment rate on credit risk structure of banks in Nigeria. The coefficient of determination R^2 showed a favorable fit of 0.875 with an adjusted R^2 of 0.750. This adjusted R^2 shows that about 75 percent of the observed changes in credit risk structure were explained by changes in GDP, NPL, Interest rate, inflation rate and unemployment rates. The overall statistics of [Fcal = 7.008 > $Fcri_{0.05}$ = 3.84] is in consonance with our favorable result of the

adjusted R-squared. This affirms that our model has a reasonable prediction.

However, in order to evaluate the statistical significance of GDP, NPL, Interest rate, inflation rate and unemployment rate on credit risk structure, the t-statistic value was used and it was discovered that the expected apriori expectation for the independent variables confirmed our theoretical stance on GDP, NPL, Interest rate, except for inflation rate and unemployment rate that do not have any significant effect on credit risk structure of banks. The relationship of all the independent variables were given as follows [t_{cal} = 3.965, 4.625, 3.4487 and -4.314 > $t_{0.05}$ = 1.697] for GDP, NPL, Interest rate and unemployment rates on credit risk structure respectively, indicating that all except for unemployment had a positive effect on credit risk architecture, while [t_{cal} = - 0.553 < $t_{0.05}$ = 1.697] inflation rate also had a negative but insignificant effect on credit risk architecture. The Durbin-Watson (D.W.) of 1.95 reflects no correlational threat or independent error. This is because it is within the range of 2.

4.3 Test of Hypotheses

Hypothesis One

H_0: Credit risk architecture does not significantly affect the loan recovery of selected banks in Nigeria.
H_1: Credit risk architecture significantly affects the loan recovery of selected banks in Nigeria.
In response to the first hypothesis, we undertook a study to observe the existence of statistical relationships between credit risk architecture and loan recovery of selected banks in Nigeria. The results revealed a t-statistic of 2.299 for credit risk architecture on loan recovery. This confirms that there is a significant effect of credit risk architecture on loan recovery of selected banks in Nigeria. This is also supported by the high result in our f-statistics that is more than our cut off point. To this end, Credit risk architecture significantly affects the loan recovery of selected banks in Nigeria. H_1 is therefore accepted and H_0 is rejected.

Hypothesis Two

In this hypothesis we evaluated the effect of GDP, NPL, interest rate, inflation rate and unemployment on the credit risk structure of the selected banks in Nigeria. The outcome of the test revealed that the estimated p-value for GDP, NPL, interest rate, unemployment except for inflation rate on the credit risk structure [tcal = 3.965,4.625,3.48, -4.314 > $t_{0.05}$ = 1.697] were less than the cutoff point. Although the p-value for inflation rate was insignificant; this result corroborated with our F-statistic [Fcal = 7.008 > $Fcri_{0.05}$ = 3.84]. This result confirms that GDP, NPL, interest rate, interest rate and unemployment significantly affect the credit risk architecture of the selected banks in Nigeria. H_1 is therefore accepted for GDP, NPL, interest rate, and unemployment on their significant effect on credit risk architecture of the selected banks in Nigeria.

4.3 Discussion of Findings

This study focused on credit risk management in Nigerian Banks between 2005 and 2015. It evaluated two major hypotheses and the results are as follows:

Hypothesis one shows that credit risk architecture significantly affect the loan recovery of selected banks in Nigeria. This result culminates into the fact that adequate credit risk architecture enhances loan recovery and adequate reduction of non-performing loans. This result corroborates our apriori expectation which specifies that credit risk architecture significantly affect loan recovery by Nigerian banks. This outcome was consistent with the study of Kargi (2011) who examined the relationship between credit risk on the profitability of Nigerian banks over the period 2004-2008. His findings revealed that credit risk management has a significant impact on the profitability of Nigerian banks.

The result of hypothesis two established that GDP, NPL, interest rate, and unemployment except for inflation rate significantly affect the credit risk structure of the selected banks in Nigeria. The outcome of this result shows that effect of GDP, interest rate and unemployment rate on credit risk corroborates our apriori expectation; while, NPL and inflation rate contradict our apriori expectations. This result in terms of NPL contradicts Agyei and Dasah (2012) who specified that debt capital influences bank profitability positively and significantly.

5.0 Conclusion

Management of credit risks has been identified to be critical for the survival and growth of banks. Credit risk architecture usually depends to a very large extent on the risk appetite and culture of the company. This architectural consideration revolves on maintaining tight credit risk metrics which largely need to be delivered in real time, depending on the product set and markets covered. Tight credit risk management means that there is need to restrict the size of the individual manager (or group, smaller or larger) directional bias; it has to maintain well defined, monitored and acted upon drawdown limits.

As part of the assessments required to establish the major areas important for the credit risk management in a financial institution, it is important for the system architects to consider the importance of an integrated workflow across execution and credit risk management systems; credit risk management functionality

requirements in terms of priorities mainly involving credit risk diagnostic-predictive analysis - hedging and portfolio analysis; historical data and performance measurement requirements and overall existing credit risk management systems assessment. The actualization of these approaches will assist banks in the stabilization and enhancement of their existing systems credit risk management, of not only meeting regulatory requirements but improving data quality and flexibility to ensure favourable loan recovery.

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